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E7.2 - 1 0.2.8.8.

CR - 129278

## DETECTION AND MONITORING OF VEGETATION DAMAGE ASSOCIATED WITH HIGHWAYS AND HIGHWAY FACILITIES

(E72-10288) DETECTION AND MONITORING OF  
VEGETATION DAMAGE ASSOCIATED WITH HIGHWAYS  
AND HIGHWAY FACILITIES Interim E.G.  
Stoeckeler (Maine Dept. of Transportation,  
Augusta.) Nov. 1972 6 p CSCL 13B

N73-13338

Unclas  
00288

Ernest G. Stoeckeler  
Maine Department of Transportation - Bureau of Highways  
State House  
Augusta, Maine 04330

November 1972

Interim Report for Period May - November 1972

Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GODDARD SPACE FLIGHT CENTER  
Greenbelt, Maryland 20771

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Prepared for  
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GODDARD SPACE FLIGHT CENTER  
Greenbelt, Maryland 20771

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. <b>Type II - No. 1</b>	2. Government Accession No. --	3. Recipient's Catalog No. --	
4. Title and Subtitle <b>DETECTION AND MONITORING VEGETATION DAMAGE ASSOCIATED WITH HIGHWAYS AND HIGHWAY FACILITIES.</b>		5. Report Date <b>30 November 1972</b>	
		6. Performing Organization Code <b>ST 350</b>	
7. Author(s) <b>Ernest G. Stoeckler ST 350</b>		8. Performing Organization Report No. --	
9. Performing Organization Name and Address <b>MAINE DEPARTMENT OF TRANSPORTATION Bureau of Highways, Materials &amp; Research Division Box 1208 Bangor, Maine 04401</b>		10. Work Unit No. --	
		11. Contract or Grant No. <b>NAS5-21724, NMC 0205</b>	
12. Sponsoring Agency Name and Address <b>Mr. Edmund F. Szajna GSFC Code 430 Greenbelt, Maryland 20771</b>		13. Type of Report and Period Covered <b>Type II, May - November 1972</b>	
		14. Sponsoring Agency Code --	
15. Supplementary Notes <b>Prepared in cooperation with Mr. Raymond Woodman (Contract NAS5-21747)(NMC 0205)</b>			
16. Abstract <b>A limited amount of good cloud-free satellite imagery has been received for data extraction. U-2 support aircraft imagery flown 20 September and received 30 November is the first cloud-free underflight photography received. Contract photography obtained in August and September is of excellent quality. Limited image analysis has been done to date, including methods of projection and viewing.</b>			
17. Key Words <b>Vegetation Stress-Highways</b>		18. Distribution Statement --	
19. Security Classif. (of this report) <b>U</b>	20. Security Classif. (of this page) <b>U</b>	21. No. of Pages <b>3</b>	22. Price --

PREFACE

NOT REPRODUCIBLE

- a. Objectives - To detect vegetation damage associated with highways and highway facilities with special reference to stress caused by chemicals and alteration of the ground water table. Monitor imagery to locate and record the extent and growth of damaged sites.
- b. Scope - To employ visual interpretation methods and limited enhancement procedures to identify stressed areas in different vegetation types. Determine the smallest damaged areas discernible on different types of imagery and underflight photography.
- c. Conclusions - a limited amount of cloud-free black and white imagery has been received to date. It is anticipated that major objectives of the study are probably attainable.

Introduction - This report contains (1) a description of photography and imagery received to date, (2) available ground truth and (3) limited analysis of the products.

1. ERTS - 1 Imagery

a. 14 August - B/W transparencies and prints of two frames, over 50% cloud cover.

b. 15 August - B/W transparencies and prints of three frames, over 50% cloud cover.

c. 1 September - B/W transparencies and prints of three frames cloud free, excellent quality. Simulated color infrared transparencies and prints ordered.

2. U-2 Underflight Photography

a. 27 April, 150 linear miles, over 60% cloud cover, 70 mm CIR transparency.

b. 20 August, four bands Vinten 70 mm transparencies, 500 linear miles, 50% cloud cover.

c. 20 September, three bands B/W only, RC 10 CIR, 500 linear miles, cloud free.

3. Local Commercial Photography

A local concern was chartered to obtain 70 mm vertical stereo coverage, at an approximate scale of 1:125,000 on two separate missions described below.

a. 15 & 16 August, color and CIR, 150 linear miles, cloud free.

b. 20 September, CIR only, Wratten 8, 12 and 15 filters, 150 clear miles, cloud free.

The sites covered in the above flights were within the U-2 corridors.

4. Low Altitude Obliques

Approximately 500 35 mm oblique and near vertical photos were taken

by the writer on eight separate flights over select study sites along the U-2 corridors flown on 20 August and 20 September. High Speed Ektachrome Ektachrome Infrared, Kodacolor and Panchromatic films were taken at altitudes varying from a few hundred to 10,000 feet under different sky conditions.

#### 5. Ground Truth

A considerable amount of ground truth relating to known vegetation stress areas has been assembled for use in this study. Locations of over 100 maintenance lots have been pinpointed on 1:62500 standard U.S.G.S. Many of these damaged areas are located along the U-2 coverage corridors. Chemical analysis for sodium and chlorine contents in soils and tissue samples are available for a number of stressed sites.

#### 6. Filing

a. Coverage of individual ERTS scenes are filed in separate folders and plotted on very small scale maps.

b. NASA and Commercial underflight photography described in Items 2 and 3 are filed by flight line in protective transparent envelopes and plotted on 1:250,000 USGS topographic maps.

c. Low altitude 35 mm views are cross-referenced to satellite and underflight imagery taken on the same date.

#### 7. Work performed

Black and white satellite transparencies and prints received in late October have been examined. Simulated color infrared transparencies and prints of several select frames have been ordered but not received to date. U-2 photography taken on 20 August and 20 September was received in November.

An analysis or comparison of the type of information discernible in the different bands has been initiated. Various methods of viewing by projection and Zoom Stereoscope have been tried. Experimental black and white enlargements to a scale of 1:250,000 have been made from several select scenes.

#### 8. Program for the Next Reporting Interval

An evaluation will be made of all imagery described in the previous paragraphs. It is anticipated that most of the evaluation will be based on visual interpretation procedures but a limited amount of work will be devoted to enhancement and color additive methods.

#### 9. Conclusions

No simulated color imagery has been received to date. Based on examination of available small scale CIR and B/W underflight photography, it is highly probable that simulated CIR will prove to be the best type of imagery for this study in areas covered by softwood forests. It is possible that other band combinations may be best for damaged deciduous forest sites.